



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/802,003 | 03/17/2004 | Akira Fujibayashi | HITC.0004 | 3319 |

7590 03/10/2006

REED SMITH LLP
Suite 1400
3110 Fairview Park Drive
Falls Church, VA 22042

| |
|----------|
| EXAMINER |
|----------|

GUYTON, PHILIP A

| | |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
|----------|--------------|

2113

DATE MAILED: 03/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|--------------------------------------|---|--|
| Office Action Summary | Application No. 10/802,003 | Applicant(s) FUJIBAYASHI, AKIRA | |
| | Examiner Philip Guyton | Art Unit 2113 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 March 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 July 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference signs mentioned in the description: secondary host group 102, and secondary SAN 121 in paragraph 41. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities: reference to "switch 121" in paragraph 42 should be "SAN 121." Appropriate correction is required.

Claim Objections

3. Claims 3 and 13 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claims, or amend the claims to place the claims in proper dependent form, or rewrite the claims in independent form. The claims recite determining the status of the first host based on I/O activity rate from the first host to the first storage system, which is already recited in independent claims 1 and 11.
4. Claim 12 objected to because of the following informalities: "the first hot" should be "the first host." Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-10 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent Pub. No. 2005/0080895 to Cook et al. (Cook).

With respect to claim 1, Cook discloses in a system including a first storage system (figure 1, item 104) at a first site (figure 1, item 106 – local site) associated with

Art Unit: 2113

a first host (figure 1, item 102 – first server) and a second storage system (figure 1, item 114) at a second site (figure 1, item 116 – remote site) associated with a second host (figure 1, item 112 – second server), wherein the first storage system and the second storage system are coupled each other by a remote copy link (figure 1, items 150, 152 – ESCON links) so that the second storage system receives a copied data from the first storage system via the remote copy link (paragraph 5), a method for checking a status of the first site, comprising:

- monitoring I/O activity from the first host to the first storage system (paragraph 30 – “The sequence 400...from the local site 106.” – PPRC Heartbeat Monitor on second server monitors heartbeats arriving at first secondary site disk, which is equates to I/O activity between first server and first primary site disk);

- determining status of the first host based on the I/O activity on the first host (paragraph 30 – “As an example, the Heartbeat Monitor checks the heartbeat...may mark the peer site as being in the ‘NOTSURE’ state.”); and

- sending the status of the first host from the first storage system to the second storage system via the remote copy link (paragraph 28 and figure 3).

With respect to claim 2, Cook discloses identifying a first volume in the first storage system (figure 1, item 138 – first primary site disk), wherein I/O activity from the first host to the first volume is monitored (paragraph 28 and paragraph 30 – “The sequence 400...from the local site 106.”).

With respect to claim 3, Cook discloses wherein the status of the first host is determined based on I/O activity rate from the first host to the first storage system

(paragraph 30 – “The sequence 400...may mark the peer site as being in the ‘NOTSURE’ state.”).

With respect to claim 4, Cook discloses wherein the status of the first host is determined as dead if the I/O activity rate is less than a first threshold (paragraph 30 - “Upon detecting a PPRC heartbeat miss...to determine if the first server’s 102 updated heartbeat information has been received at the remote site 116.” – consecutive misses exceeding a threshold corresponds to I/O activity not occurring according to the same threshold).

With respect to claim 5, Cook discloses sending an alert signal from the second storage system to the second host based on the status sent from the first storage system (paragraph 30 – “When the consecutive misses...announce that the peer is down.” and paragraph 32 – “If the confirmation signal is not received...operational over any communications link other than the PPRC communications links 150 and 152.”).

With respect to claim 6, Cook discloses the steps of:
monitoring I/O activity from the second host to the second storage system (paragraph 34 – “Referring to Fig. 4B...stored on the first secondary site disk 146.” – as on second server, PPRC Heartbeat Monitor on first server monitors heartbeats arriving at second secondary site disk, which equates to I/O activity between second server and first secondary site disk);

determining status of the second host based on the I/O activity on the second host (paragraph 35); and

sending the status of the second host from the second storage system to the first storage system via the remote copy link (paragraph 34 – “The sequence 400 may also include operation 438...second secondary site disk 140 at the local site 106.” and figure 3).

With respect to claim 7, Cook discloses identifying a second volume in the second storage system (figure 1, item 146 – first secondary site disk), wherein I/O activity from the second host to the second volume is monitored (paragraph 34 – “Referring to Fig. 4B...stored on the first secondary site disk 146).”).

With respect to claim 8, Cook discloses wherein the status of the second host is determined based on I/O activity rate from the second host to the second storage system (paragraphs 34 and 35).

With respect to claim 9, Cook discloses wherein the status of the first host is determined as dead if the I/O activity rate is less than a threshold (paragraph 30 - “Upon detecting a PPRC heartbeat miss...to determine if the first server’s 102 updated heartbeat information has been received at the remote site 116.” – consecutive misses exceeding a threshold corresponds to I/O activity not occurring according to the same threshold).

With respect to claim 10, Cook discloses sending an alert signal from the first storage system to the first host based on the status sent from the second storage system (paragraph 36 – If the confirmation signal is not received... operational over any communications link other than the PPRC communications links 150 and 152.”).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 11-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cook in view of U.S. Patent No. 6,898,730 to Hanan.

With respect to claim 11, Cook discloses a data processing system comprising:
a first storage system (figure 1, item 104) at a first site (figure 1, item 106 – local site) associated with a first host (figure 1, item 102 – first server); and
a second storage system (figure 1, item 114) at a second site (figure 1, item 116 – remote site) associated with a second host (figure 1, item 112 – second server),
wherein the first storage system and the second storage system are coupled each other by a remote copy link (figure 1, items 150, 152 – ESCON links) so that the second storage system receives a copied data from the first storage system via the remote copy link (paragraph 5),
wherein the first storage system is configured to:
send the status of the first host to the second storage system via the remote copy link (paragraph 28).

However, Cool does not disclose expressly wherein the first storage system is configured to monitor I/O requests received from the first host; and determine status of the first host based on I/O activity from the first host.

Hanan teaches a storage system in which I/O activity from a host is monitored in order to determine the host's status (column 4, lines 28-53 and column 5, line 53-column 6, line 12).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to modify Cook so that the first storage system monitors I/O activity from the first host and determines the status of the first host based on the I/O activity, as taught by Hanan. A person of ordinary skill in the art would have been motivated to do so because Hanan discloses a failover process in which a backup link may take the place of a faulty line (abstract), which would have further increased the reliability of Cook. Additionally, Hanan allows the storage subsystem itself to determine failure of the host, thus decreasing the number of data transmissions need, thus decreasing the probability of a failure. Furthermore, Hanan discloses an embodiment utilizing SCSI and fiber channel busses, as in Cook (column 1, lines 43-51), and thus would have been highly beneficial.

With respect to claim 12, Cook discloses wherein the first storage system monitors I/O requests from the first host to an identified volume thereof (paragraph 28 and paragraph 30 – “The sequence 400...from the local site 106.”).

With respect to claim 13, Cook discloses wherein the status of the first host is determined based on I/O activity rate from the first host to the first storage system (paragraph 30 – “The sequence 400...may mark the peer site as being in the ‘NOTSURE’ state.”).

With respect to claim 14, Cook discloses wherein the status of the first host is determined as dead if the I/O activity rate is less than a first threshold (paragraph 30 - "Upon detecting a PPRC heartbeat miss...to determine if the first server's 102 updated heartbeat information has been received at the remote site 116." – consecutive misses exceeding a threshold corresponds to I/O activity not occurring according to the same threshold).

With respect to claim 15, Cook discloses wherein the second storage system is configured to send an alert signal to the second host based on the status sent from the first storage system (paragraph 30 – "When the consecutive misses...announce that the peer is down." and paragraph 32 – "If the confirmation signal is not received...operational over any communications link other than the PPRC communications links 150 and 152.").

With respect to claim 16, Cook discloses a third storage system (figure 1, item 104 – as implemented with item 121 – third server) coupled with the first storage system via a first remote copy link (paragraph 16 - storage systems may be interchangeable; ie storage system 114 may be first storage system), wherein the first storage system is configured to send the status of the first host to the third storage system via the first remote copy link (paragraph 39).

Conclusion


8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. See PTO-892.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Philip Guyton whose telephone number is (571) 272-3807. The examiner can normally be reached on M-F 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Beausoliel can be reached on (571) 272-3645. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

PG
3/3/06


ROBERT BEAUSOLIEL
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100